

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 30 AUG 2005

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Applicant's or agent's file reference 88TY1319	FOR FURTHER ACTION See Form PCT/PEA/416	
International application No. PCT/IB2004/002931	International filing date (<i>day/month/year</i>) 09.09.2004	Priority date (<i>day/month/year</i>) 11.09.2003
International Patent Classification (IPC) or national classification and IPC G01S17/93, G01S13/93, G01S17/89, G01S13/86, G01S17/87		
Applicant TOYOTA JIDOSHA KABUSHIKI KAISHA et al.		
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p style="margin-left: 20px;">a. <input checked="" type="checkbox"/> <i>sent to the applicant and to the International Bureau</i> a total of 3 sheets, as follows:</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p style="margin-left: 20px;">b. <input type="checkbox"/> <i>(sent to the International Bureau only)</i> a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>		
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>		
Date of submission of the demand 24.05.2005	Date of completion of this report 26.08.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Johansson, R Telephone No. +49 89 2399-7594	



**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/IB2004/002931

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-14 as originally filed

Claims, Numbers

7-12 as originally filed

1-6 received on 24.05.2005 with letter of 24.05.2005

Drawings, Sheets

1/3-3/3 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/B2004/002931

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-6
	No: Claims	
Inventive step (IS)	Yes: Claims	1-6
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-6
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/IB2004/002931

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to D1=WO 02/103385.

D1 discloses (cf p. 32, l. 13-p. 34, l. 14 and p. 37, l. 1 - p. 38, l. 15) an object detection system in which objects are fused by either comparing the radar image with camera image or vice versa. However, D1 does not suggest to do both comparisons and then compare the resulting objects of the two independent comparisons to determine if they coincide and if so determining that the objects are the same. Moreover, there is no hint in the prior art to modify D1 towards the invention in order to increase the accuracy of detection.

Claims

1. An object detection system including radar
5 detection means (2) that detects an object using a radar,
image detection means (3) that detects an object using an
image, and collating means (4) that performs collation
between a detection result of the radar detection means
(2) and a detection result of the image detection means
10 (3),

the object detection system being characterized in
that the collating means (4) detects a combination of an
object detected by the radar detection means (2) and an
object selected among those detected by the image
15 detection means (3), which is the closest to the object
detected by the radar detection means (2), detects a
combination of an object detected by the image detection
means (3) and an object selected among those detected by
the radar detection means (2), which is the closest to
20 the object detected by the image detection means (3),
determines whether there is a coincidence between the
combination of the object detected by the radar detection
means (2) and the selected object as being closest
thereto and the combination of the object detected by the
25 image detection means (3) and the selected object as
being closest thereto, and determines, when there is the
coincidence, that the object detected by the radar
detection means (2) is the same as the object detected by
the image detection means (3).

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2. The object detection system according to claim
1, characterized in that the radar detection means (2)
comprises at least one of a millimeter-wave radar and a
laser radar.

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3. The object detection system according to claim 1 or 2, characterized in that the image detection means (3) comprises a stereo camera.

5 4. A method of detecting an object in a system (1) including radar detection means (2) that detects an object using a radar, image detection means (3) that detects an object using an image, and collating means (4) that performs collation between a detection result of the
10 radar detection means (2) and a detection result of the image detection means (3),

the method being characterized by comprising the steps of

15 detecting a combination of an object detected by the radar detection means (2) and an object selected among those detected by the image detection means (3), which is the closest to the object detected by the radar detection means (S1, S2);

20 detecting a combination of an object detected by the image detection means (3) and an object selected among those detected by the radar detection means (2), which is the closest to the object detected by the image detection means (S3, S4);

25 determining whether there is a coincidence between the combination of the object detected by the radar detection means (2) and the selected object as being closest thereto and the combination of the object detected by the image detection means (3) and the selected object as being closest thereto; and

30 determining, when there is the coincidence, that the object detected by the radar detection means (2) is the same as the object detected by the image detection means (S5).

5. The method according to claim 4, characterized in that the radar detection means (2) comprises at least one of a millimeter-wave radar and a laser radar.

5 6. The method according to claim 4 or 5, characterized in that the image detection means (3) comprises a stereo camera.